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UNITED STATES ARMY-BAYLOR UNIVERSITY
GRADUATE PROGRAM IN HEALTH ADMINISTRATION

AN ANALYSIS OF THE IMPACT OF REENGINEERING ON COST, QUALITY, AND
ACCESS AT KELLER ARMY COMMUNITY HOSPITAL

A GRADUATE MANAGEMENT PROJECT SUBMITTED TO
LIEUTENANT COLONEL RICHARD L. HOLMES, PH.D.

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WEST POINT, NEW YORK

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ABSTRACT

As the popularity of managed care continues to grow among various payer groups, traditional provider organizations increasingly struggle to survive. Hospitals, in particular, are under tremendous pressure to reduce costs and improve quality and access. During the last few years, many hospitals have resorted to the concept of reengineering as a strategic response to pressures from payers, patients, and government.

Reengineering is defined as the "fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in contemporary measures of performance, such as cost, quality, service, and speed." (Bergman 1994). The goal of reengineering is to improve the efficiency of operations - increasing output with fewer, or at least, less expensive inputs. For many health care organizations this translates to reducing staff and shifting the site of delivery to an outpatient environment.

Keller Army Community Hospital, like its civilian counterparts, is under extreme pressure to operate more efficiently. Tricare, the Department of Defense's managed care program, radically changes the environment in which Keller operates. To respond to this changing environment, Keller embarked on a reengineering initiative in early 1993. Full implementation occurred in the fall of 1994.

This study analyzes the impact the reengineering initiative has had on cost, quality, and access by comparing select performance indicators from 1993 through 1995. The results suggest that Keller's total cost per user has steadily declined. Despite this finding, labor efficiency in both the inpatient and outpatient settings has eroded. Quality performance has essentially remained unchanged.

The most visible impact of the reengineering has been on access to health care services. Outpatient access at Keller has eroded significantly during the past three years. The percentage of outpatient visits incurred under the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) increased nearly 70 percent during the study period. Inappropriate use of emergency services for primary care increased nearly 8 percent.

The results demonstrate that reengineering can be a powerful method to reduce costs. Previous research suggests dramatic efficiencies can be gained when process improvement is the focus of reengineering. However, these results also indicate that reengineering may have a negative impact on the patient's ability to access care. This may directly affect an organization's ability to maintain and increase market share in a managed care environment.

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The Impact of Reengineering on Cost, Quality, and Access at Keller Army Community Hospital

INTRODUCTION

During the early 1990's health care reform came to the forefront of public debate. The main issue in this debate is cost control. Since 1970, the rate of growth in health care expenditures has outpaced the rate of growth in the Gross National Product (Levit et al. 1991). Various attempts during the 1980's to slow the growth in health care spending largely failed to reduce costs or increase access to care. As a result, payers and consumers are resorting to closely controlling resource use and forcing health care providers to assume financial risk for care provided. These concepts, commonly known as managed care, involve paying a set rate per member per month (capitation), limiting patient choice of provider, and close scrutiny of the resources used to provide care. Managed care has shifted the primary setting of health care delivery from hospitals to outpatient settings. The result is pressure on hospitals to reduce costs and operate as efficiently as possible.

Background

The Department of Defense health care system (Military Health Services System - MHSS) is experiencing similar change and pressure. The MHSS is among the nation's largest health care systems. More than 8.3 million people are eligible to receive care from the MHSS. During fiscal year 1995, the department's health care bill was more than \$15 billion. Between 1980 and 1990, the MHSS budget increased 225 percent. The greatest increase occurred in the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS), a fee-for-service insurance program for non-active duty beneficiaries. (GAO 1995).

Additionally, the MHSS has been plagued with uneven access to care, overcrowding of treatment facilities, duplication of effort among services, lack of a standardized benefit package, and pressure to "pay its share" of active duty personnel cuts (Tricare Region 1 Lead Agent 1995). To improve services provided to members while controlling costs, the MHSS embarked on a coordinated managed care strategy in 1994. This program, called Tricare, offers CHAMPUS beneficiaries three options for receiving care while employing the controls found in managed care initiatives.

Tricare Standard is a traditional indemnity insurance program similar to the CHAMPUS program. Beneficiaries can receive care from any provider they choose and incur a large copayment and deductible. Tricare Extra is a preferred provider organization (PPO) program. By using a network provider, beneficiaries face lower out-of-pocket costs and do not have to submit insurance claims. Tricare Prime is a health maintenance organization (HMO) option. Beneficiaries must enroll in Prime to receive priority access in military medical treatment facilities. Additionally, Tricare Prime enrollees incur minimal copayments and no deductibles.

Tricare places military hospitals at financial risk for care provided to members enrolled in Tricare Prime by using capitated funding. Hospitals can increase their budgets by enrolling more members in Prime or by providing cost-effective, quality services to the Tricare managed care contractor through a complex price adjustment formula. Beneficiaries are free to enroll with their military hospital or use civilian providers.

Like civilian managed care initiatives, Tricare forces military hospitals to operate efficiently while meeting the expectations of their beneficiaries. While many of the incentives inherent to capitation are missing from the military's capitated model, hospitals must operate within a fixed budget. If the hospital can not meet the stringent access standards outlined in Tricare, the hospital must purchase care from a managed care contractor using the hospital's operating funds. The survival of the MHSS, like that of civilian institutions, hinges on the ability to control costs while improving quality and access. Griffith (1994) argues that today's hospitals will not survive without extensive restructuring of clinical practice and internal organization. Increasingly, healthcare organizations are employing a process called reengineering to create this radical restructuring (Bergman 1994).

Conditions Which Prompted the Study

Keller Army Community Hospital is a 65-bed acute care hospital located at the United States Military Academy, West Point, New York. While its primary mission is to provide health care to nearly 6,500 cadets and active duty service members assigned to West Point, Keller is also responsible for offering comprehensive health services to nearly 23,000 eligible beneficiaries within forty miles of the Academy. The hospital's core competencies are a strong primary care capability and specialty care in Orthopedic Sports Medicine. Appendix A shows the hospital's workload and performance statistics from fiscal year 1993 through fiscal year 1995.

Keller began to formulate its strategic response to Tricare in early 1993. The hospital staff recognized it must adopt a patient-centered attitude to attract enrollees to Tricare Prime. In the

spring of 1993, the staff developed a plan to reorganize the primary care departments (Family Practice, Internal Medicine, and Pediatrics) along a multidisciplinary group practice model. By the fall, the hospital's leadership adopted an organizational reengineering strategy to redesign healthcare delivery and create a culture dedicated to cost-effective, quality care (Bachman 1996).

Traditional departments were dissolved and regrouped into functional teams. Support services were grouped together under one manager. The departments of Family Practice, Internal Medicine, and Pediatrics were eliminated and these physicians grouped into two multidisciplinary primary care teams, sharing administrative and clinical support. All departments were designed to be self-managed teams, empowered to improve patient-care processes. After a prolonged period of planning, implementation began in late 1994. During this time, at least two other Army hospitals had initiated similar reengineering initiatives, with mixed results.

Statement of the Problem

To continue planning for Tricare implementation in the Northeast it is essential that the impact of Keller's initiative be assessed. Such an assessment can also provide useful information for other hospitals considering reengineering. Measuring the effect of reengineering on organizational performance will provide the Keller staff feedback on the success of their design and provide indicators for future measurement. Additionally, such quantification may provide other MHSS facilities survival strategies for a managed care environment. It is important to

determine what effect, if any, Keller's reengineering initiative has had on organizational performance.

Literature Review

The rapidly changing health care environment described previously requires radical measures by health care organizations if they are to survive. The required response for the MHSS is even more radical than that required of civilian organizations. Civilian managed care organizations have years of experience with patient satisfaction, access standards, and provider productivity. There is much speculation within the MHSS that, given a choice, patients would prefer using civilian health care providers. Complex resource sharing programs and alternative financing options under Tricare require better cost accounting and decision support systems. The MHSS must first adopt civilian business processes to compete successfully with Tricare contractors for patients.

Griffith (1994) argues the survival of health care organizations depends on the organization's ability to improve productivity. This improvement will be measured by capitated cost per member per year. Intermediate products will be evaluated in terms of cost/product (such as cost/DRG).

Griffith suspects such improvement is impossible without a radical restructuring of health care organizations. This restructuring must enhance the ability of the organization to satisfy the conflicting needs of influential stakeholders (payers, patients, providers, etc.) (Fottler et al. 1989). The greater the level of stakeholder satisfaction, the more resources an organization will

attract and the more successful it will be (Eastaugh 1992). The key to achieving higher levels of stakeholder satisfaction involves expanding the incremental approach of total quality management and continuous quality improvement (TQM/CQI) (Griffith 1994).

Michael Hammer is considered the founder of the reengineering movement. He defines reengineering as the "fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in contemporary measures of performance, such as cost, quality, service and speed." (Bergman 1994). Reengineering involves designing processes around interdependent tasks that produce an outcome that fulfills a customer's need. Bergman (1994) also identified indicators that organizations were ready to launch a reengineering initiative. These include declining profit margins, increasing patient dissatisfaction, and an inability to compete for managed care contracts.

Boston and Vestal (1994) emphasize that reengineering requires much more than moving positions and people, or changing job and department titles. They argue that successes are attained by allowing multidisciplinary teams to manage clinical processes. Since 50 percent of all hospital costs are labor expense and only 25 percent of an employee's time is spent on patient care, reducing redundancy and improving productivity is essential (Boston and Vestal 1994). The long-term goal of reengineering is a stable, financially secure organization in which quality continuously improves no matter how the environment changes.

Strasen (1994) defined the predominant form of reengineering initiated in hospitals and proposed an alternative. She describes most initiatives as "form follows function" reengineering.

This method requires in-depth employee involvement in redesigning processes (functions). As new functions are defined, the organizational structure (form) is decided. Form follows function reengineering begins with a labor intensive, six to twelve month planning phase. After implementation, results are normally reported using anecdotal evidence. This explains the lack of literature documenting concrete results of reengineering in the health care industry.

Strasen proposes an alternative model - the "function follows form" model. This model requires a change agent to identify the best organizational design (form) first, then allow stakeholders to redesign work (functions) to meet the new structure. Strasen argues that this model allows for quicker implementation (after three to six months planning) and provides concrete results by focusing on several key performance indicators. Additionally, she argues the function follows form model decreases the negativity experienced by an organization's employees during reengineering. The process does not require a destruction of professional paradigms caused by having professionals (i.e., physicians) identify alternative roles.

Strasen's article documents the results of her reengineering process in several hospitals. All of the reported initiatives resulted in increased stakeholder satisfaction, decreased length of stay, decreased labor expenses per patient day, and increased quality. Quality improvements included decreased nosocomial infection rates and decreased time for intravenous antibiotic administration. Labor cost reductions were attributed to decreases in contract and overtime usage; reductions in the number of middle managers; and reductions in idle time by use of cross-training (Strasen 1994).

Jersey Shore Medical Center, Neptune, New Jersey, set a goal of reducing controllable expenses by 25 percent for its reengineering process (Schwartz and Fritz 1996). Their plan provided each of the hospital's departments six months to create business plans for surviving a 25 percent budget reduction. Within the first three months, the proposed plans were expected to trim \$19 million from Jersey Shore's budget (14 percent of controllable costs) (Lumsdon 1995).

Moffit et al. (1993) studied the implementation of a patient-focused care (PFC) model at a 375-bed tertiary care hospital. Their results indicate an increase in productive hours per patient day after the model was implemented (8.6 hours PRE-PFC to 15.1 hours POST-PFC). By reducing tasks not directly related to patient care, Moffit's hospital was able to reduce nursing and ancillary staff while actually increasing the time available for direct patient care. This allowed the hospital to reduce labor costs while improving access to and the quality of support services. Additionally, Moffit's group used patient satisfaction as a proxy for quality indicators. The study found significant increases in patient satisfaction on the patient-focused ward compared to traditional inpatient wards. (Score of 90 for the PFC ward compared to 80.1 for the traditional ward. The maximum score was 125). The study also reported dramatic decreases in admission time for the PFC ward from a PRE mean of 448 minutes to a POST mean of 23 minutes.

Like Moffit's group, Linden and English (1994) reported impressive reductions in labor costs. Their study found labor hours per patient day decreased by 11.8 percent over one year.

Additionally, overtime hours decreased 5 percent and personnel turnover decreased by 1 percent while patient days increased 5 percent.

Donatelli (1994) found that a reengineering effort at her hospital primarily reduced labor expenses. Requirements for labor in a variety of ancillary support areas were initially offset by needs for staff training and automation. She also describes, but does not quantify, the effect of streamlined ambulatory patient flow on customer satisfaction. Intuitively, it appears customer satisfaction improved by reducing the number of stops required of patients during a visit and by reducing the time needed to report test results to providers.

MacStravic and Field (1980) made a persuasive argument that hospitals must develop specific performance indicators for cost, quality and access. They state that generic measures, such as occupancy rates, are not indicative of efficiency or bed need. Yet they provide few examples of indicators in each category.

Ernst (1994) made suggestions for implementing TQM/CQI in hospitals. She noted that quality "costs" included preventive, monitoring, internal failure, and external failure costs. Internal failures occur when a job is performed incorrectly. These are frequently measured by readmission rates within thirty days of discharge; return to the operating room; and nosocomial infections, etc. External failures are demonstrated in customer complaints and lawsuits.

Lewis, White, and Davis (1994) identified sixteen key elements of access during a benchmarking study in Southern California. The quantitative elements included physician workload, use of extenders, support staff ratio, appointment "no-shows", and patient satisfaction.

They also noted that waiting time for an outpatient appointment, including the ability to see a personal physician, affected patient satisfaction.

Torma et al. (1993) designed an integrated model for measuring cost, quality, and access at nineteen United States Air Force hospitals. They identified the ideal hospital as providing high access, high quality, and low cost and developed mathematical models to quantify all three factors. Factor scores for each facility were adjusted for severity, case mix, and patient perceptions. The design used ten quality indicators developed by the Maryland Quality Indicator Project. They derived cost scores from direct inpatient and outpatient cost per catchment area beneficiary. The access equation viewed CHAMPUS usage as a lost opportunity when occupancy was below 85 percent or outpatient appointment fill was below 98 percent. This equation was also adjusted for patient satisfaction. Torma's group found all nineteen facilities were low-cost facilities when compared to the Olmstead County Benchmark developed by the Mayo Clinic. Four facilities received favorable scores for quality and access, while nine had unfavorable scores in both areas.

Purpose

The purpose of this paper is to determine the effect of reengineering on cost, quality and access at Keller Army Community Hospital. The working hypotheses are that the reengineering project has resulted in lower costs, higher quality, and higher access to care. The objectives of the study are to determine if the reengineering initiative has improved quality of care at Keller; improved access to care at Keller; and reduced the cost of providing care.

METHODS AND PROCEDURES

This study focuses on conducting a PRE-POST study of the effect of reengineering on cost, quality, and access at Keller. Planning for the reengineering began during fiscal year 1994 with implementation during fiscal year 1995. Therefore, data from fiscal years 1993 (PRE) and 1995 (POST) are analyzed and compared. Additionally, to identify the impact of the reengineering on performance trends, data from fiscal years 1993, 1994, and 1995 are studied.

It would be useful to include performance results from the first quarter of fiscal year 1996. However, the effects of the continuing resolution through the first three months of the fiscal year represent an artificial constraint on expenditures. This probably acts to reduce cost and may adversely effect quality and access. It is also recognized that fiscal year 1995 data may not present a true post-implementation view of the impact of reengineering. Strasen (1994) and Schwartz and Fritz (1996) suggest that measurable results can be achieved in a short span of time. Therefore, some effects of the reengineering may be observable. Additionally, this study will provide useful information to the Keller staff for continuing the reengineering initiative.

Cost

To develop valid cost indicators, several assumptions must be made. First, the assumption is made that Keller's beneficiary population changed little over the study years. This means:

1. The same number of beneficiaries did not get some or all of their care from the MHSS during all study periods.
2. The same proportion of beneficiaries were eligible for Medicare and not CHAMPUS eligible for all periods.

3. And, the case mix intensity for the population did not change during the study period.

The study investigates the effect of reengineering on several cost indicators. First, total cost per user is analyzed. (A user is a DOD beneficiary who received care at Keller or through CHAMPUS while residing within a forty-mile radius of Keller). This is the broadest indicator of cost performance available for a healthcare organization. Using "users" in the denominator removes confounding changes in the beneficiary population during the study years. The number of full-time equivalent users is estimated based on a quarterly survey of military beneficiaries conducted by DOD. The projection is based on a moving average and is reported in several databases (Ebert 1996). The user estimates for Keller's catchment area were provided by the U.S. Army Medical Command's Patient Administration and Biostatistics Activity (PASBA) (1995). The data is drawn from the Resource Analysis and Performance System (RAPS).

Expense data for the total cost metric was gathered from the Standard Financial System (STANFINS), CHAMPUS, and Keller's Resource Management Division. STANFINS reports all expenses incurred by Keller during a fiscal year. It presents a more accurate picture of incurred expenses than the Medical Expense and Performance System (MEPRS) because it merely reports expenses incurred by the facility. It does not assign costs to cost centers using arbitrary basis of allocation like MEPRS does. To account for fixed costs that the Keller staff may not control, base operations expenses are excluded from the total cost calculation. Base operations included the cost of utilities, fire and police support, and similar expenses. Additionally, open allotment costs are excluded for two reasons. First, open allotment funds

were not managed by the MTFs until fiscal year 1995. Second, these funds are primarily used to provide emergency care for active duty service members who are injured or become ill while away from their home station. Since this represents emergency care, it is difficult for commanders to control these expenses. Because CHAMPUS and supplemental care costs are significant, and commanders have the opportunity to develop management strategies to control these costs, they are included in the total cost.

Most of the literature reviewed above suggests improvements in labor efficiency are possible through reengineering. To explore this issue, the study examines the total labor expenses for inpatient and outpatient care. Inpatient and outpatient costs are easily identified in Keller's cost accounting system. Inpatient costs are measured in terms of labor cost per weighted discharge. The discharges are weighted using the CHAMPUS Diagnosis Related Group (DRG) weights. Outpatient costs are evaluated in terms of labor cost per outpatient visit. Again, this assumes that outpatient case mix did not change during the study period.

A particular problem exists with the measurement of labor costs. MEPRS relies on a self-reported time system to assign labor costs to particular cost centers. As an example, a surgeon is required to report time spent providing outpatient care and time spent on inpatient care. This presents several problems. First, validity depends on the provider's accuracy in reporting how his or her time is spent. Second, MEPRS reports time usage only. Provider time is not adjusted for case mix or acuity. Therefore, inpatient and outpatient labor costs may vary significantly within a facility or across fiscal years because of fluctuation in case mix and acuity that MEPRS

does not adjust for. Inpatient labor costs can be adjusted using DRG weights. The MHSS uses no similar adjustment method for outpatient care. Outpatient care is reported as visits with no adjustments for case mix and acuity. However, assuming case mix and acuity change slowly over time, we can compare unweighted outpatient over several years. Caution should be used when comparing outpatient costs across facilities.

To adjust for the effect of inflation, all costs will be restated in 1993 dollars. Labor costs are discounted by the actual percentage pay increase for each calendar year. CHAMPUS costs are deflated using the Medical Economic Index (MEI). The MEI is the index that the Health Care Financing Agency (HCFA) uses to adjust the Medicare fee schedule. All other costs are deflated using a fiscal year index derived from the U.S. Bureau of Labor Statistics medical care composite index for New York City, New York, and Northeastern New Jersey (Bureau of Labor and Statistics 1995).

Quality

Keller has not historically subscribed to a quality indicator system. Currently, the hospital uses Interqual standards to determine appropriateness of admission and resource utilization. Prior to the implementation of the Composite Health Care System (CHCS) in 1995, the AQCESS computer system was used. To design meaningful quality indicators, it was necessary to exam what indicators were used in 1993 and compare that to indicators currently being monitored.

Of the ten indicators identified in the Maryland Quality Indicator Project, four have been tracked continuously during the study period. Unplanned readmissions within 30 days of discharge and unplanned returns to the surgical suite were dropped because Keller has averaged less than two of these occurrences each year during the study. Infant and Neonatal mortality were dropped from the study because all complicated deliveries are referred to civilian hospitals. Additionally, aggregate numbers of patient complaints and medical malpractice claims filed are examined. Inspector General (IG) complaints regarding patient services are not considered. Since 1994 Keller and the West Point IG's have channeled all such complaints to Keller's patient representative for resolution. Including IG complaints would weaken the study by potentially double counting complaints. The five quality indicators are:

1. Nosocomial Infection Rate (per 100 discharges)
2. Surgical Infection Rate (per 100 surgical procedures)
3. Cesarean Section Rate (per 100 live births)
4. Patient Complaint Rate (per 100 patient encounters)
5. Malpractice Claim Rate (per 100 patient encounters)

Patient encounters are used as the denominator for Patient Complaint and Malpractice rates to incorporate both inpatient and outpatient encounters. This number is determined by adding outpatient visits and unweighted discharges for a fiscal year.

Access

Torma et al. (1993) expressed access as a lost opportunity to care for patients. This lost opportunity is reflected in care sought through CHAMPUS. Torma's group did not consider that

CHAMPUS utilization may be caused by patient's needing services it was not cost-effective for the facility to provide. To consider CHAMPUS utilization a lost opportunity requires the assumption that the MHSS can provide all services paid for by CHAMPUS at lower cost and higher quality. This is not true in all instances. CHAMPUS utilization is only a lost opportunity when the services are available at the military hospital and at a cost lower than CHAMPUS.

Under Tricare, military hospitals determine what services it is cost effective to provide and contract with the managed care contractor for all other needed services. Therefore, under Tricare, CHAMPUS utilization is a proxy for access only when the military hospital offers the service and can not meet the Tricare access standards. Therefore, CHAMPUS can be viewed as an alternative to the military hospital. If one adopts this view, CHAMPUS is a competitor and CHAMPUS use represents lost market share.

Outpatient CHAMPUS utilization is widely considered an indicator of access. This study will examine outpatient CHAMPUS use and outpatient use at Keller. The percentage of all catchment area outpatient visits that were CHAMPUS outpatient visits will serve as the outpatient access indicator. An increase in this percentage will indicate reduced access at Keller. A decrease in the percentage shows improved access. This indicator controls for population changes if one assumes the ratio of CHAMPUS outpatient utilization to Keller outpatient utilization remains stable. The indicator also assumes that demand for outpatient services remains unchanged across the study period.

Inpatient access can easily be examined by reviewing non-availability statements issued during the study period. A simple count of non-availability statements issued for services that Keller provided will indicate improvements (or declines) in inpatient access. If fewer non-availability statements were issued in 1995 than 1994, access improved. The study will also use the methodology described above for outpatient access to analyze CHAMPUS discharges as a percentage of all catchment area discharges.

Additionally, MHSS facilities frequently experience inappropriate usage of emergency care. Patients frequently report to the emergency room (ER) for care that is best provided at outpatient clinics. Peak times for inappropriate emergency room visits are normally early evenings and on weekends, when primary care sites are closed. Keller's emergency room visits show no deviation from this phenomena. The hospital's ER staff recently reported that 98.6 percent of all ER visits during the last three fiscal years were inappropriate (Keller Army Community Hospital 1996). Therefore, the ratio of inappropriate ER visits to all Keller outpatient visits is used as an access indicator.

RESULTS

The results are summarized and discussed below. A more detailed discussion and background information is provided in Appendices B through D.

Costs

Table 1 provides the results of the cost analysis for all three fiscal years. All costs actually declined from fiscal year 1993 to fiscal year 1995 when adjusted for inflation. It is difficult to determine if this decline is due to conscious management decisions on Keller's leadership or if it is due to externally imposed constraints (i.e., budget reductions by higher headquarters or Congress). Fiscal year 1994 total costs also present an unexpected confounder. CHAMPUS expenditures actually decreased by \$835,959 (FY 93 dollars) from fiscal year 1993 expenditures. Fiscal year 1995 CHAMPUS expenditures were \$568,749 greater than fiscal year 1994. Two

TABLE 1
Results of Cost Analysis

	FY 1993	FY 1994	FY 1995
<i>Total Cost Per User</i>			
Total Cost	\$35,011,848	\$33,469,967	\$31,366,404
Number of Users	21,095	21,689	21,155
Total Cost Per User	\$ 1,660	\$ 1,543	\$ 1,483
Percent Change from FY 93	n/a	-7%	-11%
<i>Inpatient Labor Cost Per Weighted Discharge</i>			
Inpatient Labor Cost	\$ 2,487,704	\$ 2,491,805	\$ 2,330,447
Weighted Discharges	3,629	3,091	3,015
Inpatient Labor Cost Per Weighted Discharge	\$ 686	\$ 806	\$ 773
Percent Change from FY 93	n/a	+18%	+13%
<i>Outpatient Labor Cost Per Visit</i>			
Outpatient Labor Cost	\$ 6,394,067	\$ 6,212,765	\$ 6,009,800
Outpatient Visits	168,502	149,244	151,030
Outpatient Labor Cost Per Visit	\$ 38	\$ 42	\$ 40
Percent Change for FY 93	n/a	+11%	+5%

factors explain this decline. First, Keller had an unusually high catastrophic cap in fiscal year 1995 due to extremely high CHAMPUS costs per case in fiscal year 1994. (The catastrophic cap is adjusted based on historical cost per case. Hospitals are reimbursed for all expenses incurred above the cap). Second, Keller intensively managed nonavailability statements in fiscal year 1994. As a result, CHAMPUS discharges were significantly lower in 1994 than 1993 and 1995. This lower inpatient utilization accounts for most of the observed decrease in CHAMPUS expenditures.

Despite declining costs and a declining total cost per user, inpatient and outpatient labor costs per unit of output (weighted discharges for inpatient; visits for outpatient) increased in fiscal year 1995 when compared to 1993. However, these measures declined between fiscal years 1994 and 1995. Appendix B presents a detailed discussion of the cost analysis.

Quality

Table 2 shows the quality indicators for each study year and the percentage change from fiscal year 1993 to fiscal year 1995. The results indicate no measurable change in the quality of services provided by Keller over the study years. Nosocomial and surgical infection rates remain

TABLE 2

Results of Quality Analysis

Indicator	FY 93 Rate per 100	FY 94 Rate per 100	FY 95 Rate per 100	% Change from FY 93	Rate Metric
Nosocomial Infections	1.53	1.58	1.50	-1.7 %	Discharges
Surgical Infections	0.59	0.76	0.66	+11.9%	Procedures
Cesarean Sections	26.09	31.32	30.12	+15.4%	Live Births
Patient Complaints	0.22	0.19	0.24	+9.1%	Encounters
Malpractice Claims	0.002	0.002	0.001	-50.0%	Encounters

well below national norms. (approximately 2 percent. Northern Metropolitan Hospital Association 1996). The cesarean section rate increased dramatically between fiscal years 1993 and 1994 and has remained significantly higher than the national and local norms (23 cesarean sections per 100 live births. Northern Metropolitan Hospital Association 1996).

Patient satisfaction indicators present mixed results. Patient complaints per 100 encounters increased 9 percent between fiscal years 1993 and 1995 despite a drop in 1994. The magnitude of the change is attributed to the low rate of patient complaints.

Malpractice claims filed under the Federal Tort Claims Act were matched to the date in which the alleged tort actually occurred. Any claim filed was considered regardless of the adjudicated or settled result since the filing of the claim represents an unsatisfied customer. It currently appears that Keller experienced a 50 percent reduction in tort claims during the study period. However, it is important to remember that the statute of limitations under the FTCA is two years from the occurrence of the injury. Therefore, the potential for unfilled tort claims from fiscal year 1994 and 1995 still exists.

Access

Table 3 shows the results of the access analysis. Inpatient CHAMPUS use was reduced significantly during fiscal year 1994 compared to fiscal year 1995. Although CHAMPUS nonavailability statements increased nearly 25 percent from fiscal year 1994 to 1995, it remained well below the 1993 level. The percent of catchment area discharges generated by CHAMPUS increased 1 percent during the study period.

TABLE 3

Results of Access Analysis

	FY 93	FY 94	FY 95
<i>INPATIENT ACCESS</i>			
NAS Issued	405	276	344
Percent Change from FY 93	n/a	-31.9%	-15.1%
CHAMPUS Discharges	894	600	801
Total Discharges	4,685	3,892	3,992
CHAMPUS Percentage of Total Discharges	19.1%	15.4%	20.1%
Percent Change from FY 93	n/a	-16.9%	-14.8%
<i>OUTPATIENT ACCESS</i>			
CHAMPUS Outpatient Visits	20,128	21,581	33,372
Total Outpatient Visits	188,630	170,825	184,402
CHAMPUS Percentage of Total Outpatient Visits	10.7%	12.6%	18.1%
Percent Change from FY 93		+17.8%	+69.2%
<i>EMERGENCY ROOM USE</i>			
Inappropriate ER Visits	10,815	12,097	11,646
Keller Outpatient Visits	168,502	149,244	151,030
ER Percentage of Keller Outpatient Visits	6.4	8.1	7.7
Percent Change from FY 93	n/a	+26.6%	+20.3%

Outpatient CHAMPUS use shows significant increases from fiscal years 1993 and 1995. CHAMPUS outpatient visits accounted for 18.1 percent of total outpatient visits (Keller and CHAMPUS visits) in fiscal year 1995, a 69.2 percent increase from fiscal year 1993. The number of CHAMPUS outpatient visits increased by 65.8 percent during the same period.

Emergency room use also increased significantly during the study period. Inappropriate emergency room visits as a percentage of all Keller outpatient visits increased more than 20

percent from 6.4 percent of outpatient visits in fiscal year 1993 to 7.7 percent in fiscal year 1995.

Appendix C contains a complete discussion of the access analysis.

DISCUSSION

The purpose of Keller's reengineering was to focus the staff on providing high-quality, cost-effective service to all customers, but ultimately to the patient. The data analyzed in this study suggest mixed results so far. Total costs, when adjusted for inflation, have steadily decreased during the study period. Coupled with a stable user population, total cost per user has also declined. However, this decline in costs can be attributed to several factors. First, during the study period, the MHSS has experienced smaller growth in budget authority. This may well translate to budget growth at Keller that is less than the rate of inflation, resulting in a decline in the hospital's ability to obligate funds. The result of this would be decreased services. Second, the absence of open allotment expenditures in the total cost figure minimizes the impact of emergency care on the operations of the hospital. Another potential confounder is the inflation indices used. Changes in the CHAMPUS fee schedule may not be identical to those reflected by the MEI. Since Keller can purchase many supplies and equipment at deep discounts through centralized contracts, other medical costs may not experience the same growth rates captured by the medical care index.

Finally, user estimates present another area of concern. These estimates are based on a quarterly survey of a large sample of military beneficiaries. The department maintains a moving average based on the survey results. However, sampling errors may impact study results.

Additionally, user data was not estimated by catchment area during fiscal year 1993. However, the Office of the Assistant Secretary of Defense for Health Affairs (ASD-HA), which conducts the MHSS National Beneficiary Survey, suggests applying the quarterly moving average for fiscal years 1994 and 1995 users to the fiscal year 1993 DEERS population (Ebert 1996).

Assuming users do not vary greatly, estimating fiscal year 1993 users in this way is a valid method to obtain catchment area users (Keller's estimated users have changed less than 2 percent over the six quarters for which data is available).

Inpatient labor cost per weighted discharge increased 1.9 percent from fiscal year 1993 to fiscal year 1995, although fiscal year 1995 costs were 11 percent lower than 1994. This is probably due to the consolidation of the medical and surgical wards into one ward. It is interesting to note that this occurred during a period of real decline in total inpatient labor costs. Bed days and discharges declined significantly during the study period while case mix index remained stable. This suggests an opportunity to reduce labor costs in support of inpatient care below fiscal year 1993 levels.

Outpatient labor costs per visit increased 4.9 percent during the study period while outpatient visits decreased by 10.4 percent. As with the inpatient labor costs, total outpatient labor costs indicate a real decline when adjusted for inflation. This suggests an increasing level of inefficiency in the outpatient areas. Both inpatient and outpatient labor costs indicate an increase in civilian manpower while the use of military manpower in the inpatient arena is declining (as indicated by labor costs). Since the true costs of military benefits are frequently underestimated

in both STANFINS and MEPRS, Keller may be replacing military manpower with what appears to be a more expensive substitute. Another possible explanation is the short-term behavior of labor costs. These costs, over a three year period, can be considered fixed costs. Therefore, these fixed labor costs are spread over a smaller number of units produced, increasing the cost per unit.

The labor cost analysis warrants one cautionary note. The allocation of costs to inpatient and outpatient care is based on the self-reporting of how an employee spends their time. Improved or increasingly poor reporting may effect the amount of labor costs allocated to a given service. Given increased attention to MEPRS reporting by the Keller staff over the past two years, a portion of the changes in inpatient and outpatient labor costs is probably caused by improved reporting by the staff.

The quality analysis suggests little change over the past three years. The apparent decline in malpractice claims against Keller must be viewed in light of the statute of limitations under the FTCA. The small number of tort claims also influences the magnitude of the change in rate of claims filed. Additionally, given Keller's low DRG weight and emergency room usage (for true emergencies) one could appropriately consider Keller a low risk facility. The cesarean section rate is cause for alarm. In 1995, the national and New York State rate was approximately 23 cesarean sections per 100 live births. Keller's rate is nearly seven percentage points higher. This is particularly disturbing when one considers that a majority of the complicated deliveries are referred to a tertiary care facility.

The lack of patient satisfaction survey results weaken the quality analysis of this study. Patient complaint rates are an acceptable proxy but indicate only the degree of dissatisfaction experienced. The analysis presented here only shows that the patient complaint rate is similar to that of fiscal year 1993. It is difficult to argue that the reengineering has improved or adversely affected patient satisfaction at Keller.

Perhaps a better indication of the impact of reengineering on Keller's patients are the access indicators. The inpatient access analysis shows that Keller has moved away from the utilization management processes it used to control nonavailability statements (NAS's) during fiscal year 1994. The number of NAS's issued in fiscal year 1995 increased by 25 percent from 1994. One explanation for this increase was a change in the Deputy Commander for Clinical Services (DCCS). The DCCS is the initial approval/denial authority for NAS's. Individual perceptions and criteria for medical necessity may account for part of this increase. Also, during most of 1994, a nurse with case management experience was the Chief of Managed Care. This may have helped hold the NAS count below historical use. While fiscal year 1995 NAS's were below that of 1993, the one year jump gives reason for concern.

Outpatient access and emergency room use are the most disturbing indicators. There normally is no external control mechanism on the use of emergency room for primary care. The only control on outpatient CHAMPUS utilization is out-of-pocket costs. Given the insurance coverage of Keller's beneficiaries, out-of-pocket costs may not be a significant barrier to outpatient care. Most of Keller's active duty population is senior company grade and field grade

officers (higher than average income for most installations). Additionally, 9 percent of Keller's active duty family members report having some other form of insurance (national average = 7 percent). More than 50 percent of Keller's CHAMPUS eligible retirees have other forms of insurance (national average = 43 percent) (Ebert 1996).

The significant increase in CHAMPUS outpatient utilization, particularly between fiscal years 1994 and 1995, indicates the reengineering had a negative impact on primary care access. During the study period, Keller's staff remained stable and received robust support from the Army reserves during provider deployments. Additionally, the increase in inappropriate emergency room utilization between fiscal years 1993 and 1995 further support the hypothesis that the reengineering initiative resulted in decreased access to care at Keller.

CONCLUSIONS

The data presented in this analysis are insufficient to develop a definitive conclusion on the impact of reengineering at Keller. The cost analysis presents a strong argument that opportunities exist to improve efficiency by continuing to reengineer the processes by which health services are delivered. With the exception of cesarean section rates, the quality data is inconclusive. The access analysis clearly indicates that access to health care services at Keller has been reduced over the study period.

Based on the analysis presented previously, we can not reject the hypotheses that reengineering did not reduce costs; reengineering did not improve quality; and that reengineering

did not improve access. Indeed, the one definitive conclusion we can draw is that reengineering has significantly reduced access to care. During the study period, particularly during fiscal year 1995, the only major change in Keller's outpatient processes was the creation of multidisciplinary group practice teams from three traditional primary care departments. No significant decrease in physician or support staff occurred in this area.

The access problem implies major challenges ahead for Keller. Beginning in fiscal year 1998, Keller's operating budget will be driven by the number of beneficiaries enrolling in Tricare Prime. The sharp increase in CHAMPUS outpatient use during the study suggest Keller is rapidly losing market share for outpatient services. This trend must be reversed if Keller is to maintain its current operating budget and staffing levels.

This does not mean that Keller's reengineering initiative is a failure. Several factors must be considered that were not measured in this study. Employee satisfaction was not explored in this study. Improvements in employee satisfaction, team work, and increased commitment to organizational values need to be considered in addition to the results presented here.

As discussed earlier, a comprehensive patient satisfaction survey should be implemented to determine to what degree the organization is meeting or exceeding patient and community expectations. Such a survey should have demonstrated reliability and validity. Use of the same survey over time to acquire comparison data is also essential.

Finally, the industry is undecided on the best way to reengineer an organization. Bachman (1996) suggests that such radical change requires a cultural transformation that takes years to

accomplish. He argues that Keller's culture had to change before any significant process redesign could begin. Strassen (1994) and Schwartz and Fritz (1996) argue that measurable improvements can be seen in as short as six months. It is clear that Keller followed Strassen's "form follows function" model (1994). This requires a long period of planning and results, in the near-term, in a great deal of turmoil for the staff. Therefore, it may be too early to draw definitive conclusions from Keller's experience. It appears that much of Keller's staff has just emerged from what Strassen refers to the denial and anger phases of "form follows function" reengineering. This suggests the best use of this study and future research is not as a measure of success, but as a road map for future process reengineering.

APPENDIX A - KELLER WORKLOAD & BACKGROUND

Keller Army Community Hospital is a 65-bed community hospital located at the United States Military Academy, West Point, New York. Its primary mission is to provide health care services to 4,200 cadets and 2,300 active duty instructors and support personnel. Another 23,000 active duty family members and military retirees are eligible for care at Keller. Table A-1 provides a synopsis of Keller's beneficiary population and historical performance measures.

TABLE A-1

Keller Army Community Hospital Background Information

	<i>FISCAL YEAR</i>		
	1993	1994	1995
<i>Beneficiary Population</i>			
DEERS Beneficiaries	30,008	32,023	29,033
DEERS Beneficiaries Over Age 65	6,241	6,271	6,660
RAPS Full-Time Users	21,095	21,689	21,155
Full-Time Users Over Age 65	1,612	1,641	1,698
<i>Workload Indicators</i>			
Discharges	3,791	3,292	3,191
Average Facility DRG Weight	0.96	0.94	0.94
Weighted Discharges	3,629	3,091	3,015
Bed Days	9,404	8,437	8,005
Length of Stay	2.5	2.6	2.5
Surgical Procedures	1,368	1,311	1,375
Live Births	207	182	166
Outpatient Visits	168,502	149,244	151,030
<i>CHAMPUS Use</i>			
CHAMPUS Discharges	894	600	801
CHAMPUS Outpatient Visits	20,128	21,581	33,372
Total CHAMPUS Use	21,022	22,181	34,173
<i>Nonavailability Statements</i>			
Inpatient	191	128	159
Outpatient	214	148	185
Total	405	276	344

Keller's eligible beneficiary population (DEERS beneficiaries) has remained fairly stable during the study period. From fiscal year 1993 to fiscal year 1995, the eligible population decreased by 3.3 percent. Medicare-eligible retirees comprise 21 percent of Keller's eligible population. This portion of the population has grown by 6.7 percent over the last three fiscal years (The RAPS database suggests a much lower growth rate, but DEERS reflects an actual count of eligibles by zip code).

The estimates of full-time Keller users (determined by the MHSS National Beneficiary Survey conducted quarterly since 1993) suggest 70 percent of Keller's eligible population use the MHSS (Keller or CHAMPUS) as their primary source of health care services. Medicare-eligible retirees make up nearly 8 percent of the estimated users. It is important to note the impact of Medicare-eligible retirees on the MHSS. This group of beneficiaries are not eligible for Tricare Prime and the contractor receives no money to care for these people. When an MTF does not have sufficient capacity to treat Medicare-eligible retirees, Medicare becomes the payer of health care services. Therefore, to some degree, Medicare-eligibles treated in the MTF under Tricare represent a form of uncompensated care. (DOD estimates \$1.9 billion was spent caring for Medicare-eligible retirees in the MHSS during fiscal year 1995) (Joseph 1996). Given Tricare Prime enrollment projections of 1,500 patients per provider, Keller can probably continue to care for this group using one primary care physician.

Keller's workload performance does not differ from what is expected of a hospital operating in an increasingly managed care environment. Both discharges and bed days declined

significantly during the study period (16 and 15 percent, respectively). Average length of stay and average DRG weight (a proxy for case mix index) remained stable.

Keller's top three DRGs are dental extractions, digestive disorders, and viral illness. A majority of these patients are cadets. Academy policy prohibits Keller from prescribing bed rest for cadets, so hospital admission is the only viable option under this restriction. This explains the low DRG weight the facility maintains (0.96). A majority of the surgical procedures performed are operative sports medicine procedures. This is due to the presence of DOD's only fellowship program in Joint and Soft Tissue Trauma at Keller. The Academy's NCAA sports program and aggressive physical training requirements generate much of the surgical cases.

The number of live births performed at Keller have decreased steadily during the study period. However, the number of nonavailability statements issued for pregnancy-related care has also decreased (from 63 in 1993 to 38 in 1995). Particularly disturbing is the rapid drop in outpatient visits at Keller and the respective increase in CHAMPUS outpatient visits. See Appendix C for a detailed discussion of CHAMPUS utilization and Keller's outpatient decline.

APPENDIX B - COST ANALYSIS

Griffith (1994) argues that total capitated cost per member per year becomes the key metric for organizations operating in a managed care environment. Several components comprise Keller's total costs. STANFINS costs are aggregate costs for labor, supplies, equipment, contracts, rents, etc. as reported by the host installations Directorate of Resource Management. The MEPRS system uses STANFINS data to assign costs to cost centers throughout the organization. MEPRS uses the double step-down method required by HCFA for Medicare and Medicaid cost reporting. Due to discrepancies between MEPRS and STANFINS, Keller's resource management staff recommended STANFINS as the most accurate total costs for the organization.

Supplemental care costs are incurred when care required by an active duty service member residing within Keller's forty mile catchment area can not be provided by the MHSS. These patients are referred to civilian providers and Keller pays for the care. Keller uses supplemental care for a variety of services including inpatient psychiatry, diagnostic imaging, and other specialty care. These costs are tracked by Keller's resource management and managed care staffs.

The third component of Keller's total costs are CHAMPUS costs. CHAMPUS is used to provide care for family members of active duty and for retirees and their family members under sixty-five years of age. Nearly all inpatient services paid for under the CHAMPUS program require a review of medical necessity. When a procedure or service is deemed necessary, Keller

issues a nonavailability statement for that care. Most outpatient services do not require statements of nonavailability or any review process. Therefore, outpatient CHAMPUS costs are the most difficult to control and are widely viewed as a proxy for outpatient access and patient satisfaction with the facility.

The reader should note that MHSS commanders are able to negotiate discounts for supplemental care and CHAMPUS care from the published CHAMPUS Maximum Allowable Charge (CMAC). Commanders can institute utilization management controls to help manage these costs. Therefore, reengineering an organization's policies and procedures can dramatically and quickly effect these costs.

To allow an "apples to apples" comparison of fiscal year costs, total costs must be adjusted to account for the effects of inflation. This is commonly done by discounting a current year's costs by the observed rate of increase in prices from the previous year. To develop the most accurate discount rate, two rates were chosen. STANFINS and supplemental care costs were discounted using a fiscal year discount rate derived from the Bureau of Labor Statistics medical care index. This index is part of the Consumer Price Index (CPI) and is available in both seasonally adjusted and unadjusted forms on a regional and national basis. Because the study did not seasonally adjust Keller's costs, the medical care index was not seasonally adjusted. The index for Keller's geographic region (New York City, New York State, and Northeastern New Jersey) was used. CHAMPUS costs are discounted using the Medical Economic Index (MEI). HCFA uses the MEI to adjust Medicare fee schedules each fiscal year. Table B-1 presents a detailed analysis of

TABLE B-1

Total Capitated Cost Per User

<i>TOTAL COST PER USER:</i>	FY 93	FY 94	FY 95
STANFINS Costs	\$29,940,756	\$30,240,385	\$31,092,550
Supplemental Care Costs	\$ 607,208	\$ 799,761	\$ 820,425
STANFINS + Supp. Care	\$30,547,964	\$31,040,146	\$31,912,975
Medical Care Index	n/a	4.0%	4.4%
Adjusted STANFINS + Supp. Care	\$30,547,964	\$29,842,042	\$27,169,730
CHAMPUS Costs	\$ 4,463,884	\$ 3,711,367	\$ 4,574,106
MEI (CHAMPUS)	n/a	2.3%	2.1%
Adjusted CHAMPUS Costs	\$ 4,463,884	\$ 3,627,925	\$ 4,196,674
<i>Total Adjusted Costs</i>	\$35,011,848	\$33,469,967	\$31,366,404
Users	21,095	21,689	21,155
<i>Adjusted Total Cost/User</i>	\$ 1,660	\$ 1,543	\$ 1,483
Percent Change from FY 93	n/a	-7.02%	-10.67%
Percent Change from FY 94	n/a	n/a	-3.92%

Keller's total capitated cost per user per fiscal year. Table B-2 displays the discount rates and supporting data.

The adjusted total capitated cost per user decreased significantly in fiscal year 1994 despite a slight increase in users. This is attributed to the steep decline in CHAMPUS discharges. The result is a \$836,000 decrease in CHAMPUS costs. Despite more than \$500,000 increase in CHAMPUS expenses in fiscal year 1995, Keller's capitated cost per user declined another 4 percent.

It is difficult to attribute the 4 percent decrease in total capitated cost per user to Keller's reengineering. External budget constraints have pressured the MHSS to seek innovative ways to control costs. Congressional budgets have frequently increased budget authority by a rate less

TABLE B-2

Discount Rates

Fiscal Year Medical Care Consumer Price Index													
F. Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	FY Avg.
1993	202.80	203.10	203.30	205.10	205.50	206.60	207.90	208.90	208.90	209.50	210.70	211.00	206.94
1994	211.30	211.40	212.00	213.50	214.20	215.10	215.80	216.50	217.70	218.20	218.70	218.60	215.25
1995	220.60	220.60	221.70	223.20	225.10	225.30	225.60	226.00	226.00	226.20	227.40	228.00	224.64
	% From 93												
	Change												
FY 93	5.08%	0.00%											
FY 94	4.01%	4.01%											
FY 95	4.36%	8.55%											
Source:	Bureau of Labor Statistics, Internet Home Page (http://istas.bls.gov:80/cgi-bin/dsrv?cu); Medical Care CPI for NY, NY-Northeastern NJ, not seasonally adjusted)												
Fiscal Year Medical Economic Index:													
FY 1993	2.70%												
FY 1994	2.30%												
FY 1995	2.10%												
Source:	Teach, R.L. 1996. 1996 Medicare final rule: Physician Fee Schedule. MGMA Special Supplement. 1996. Englewood, Colorado.												
Fiscal Year Pay Raises:													
F. Year	Civilian	Military											
1993	3.70%	3.70%											
1994	2.60%	2.60%											
1995	2.60%	2.60%											
Source:	Defense Finance & Accounting Office, USMA, West Point, New York. 1996.												

than observed inflation, resulting in a decline in budget authority. Since most reengineering efforts are focused on increasing efficiency through reduced labor costs, labor costs must be examined.

Inpatient labor costs per unit are best reflected by Keller's labor cost per weight discharge. Outpatient labor costs per unit are measured in terms of labor cost per visit. To account for the impact of wage inflation, all labor costs are discounted by the actual pay raise authorized by Congress for that calendar year. (See Table B-2). Table B-3 shows the inpatient and outpatient labor costs per unit.

As expected in a managed care environment, Keller's inpatient labor costs have steadily declined as weighted discharges and lengths of stay have declined. Despite these aggregate gains, costs per weighted discharge increased during the study period, due almost entirely to a 14.6 percent increase in fiscal year 1994. Fiscal year 1995 costs per weighted discharge drop 11 percent from 1994 but remained nearly 2 percent above fiscal year 1993 costs. It is notable that during this period, weighted discharges declined by nearly 17 percent. This strongly suggests Keller has not realized an optimum level of inpatient labor efficiency.

Outpatient labor costs per visit present a similar picture. Outpatient visits dropped by 10 percent from fiscal year 1993 to 1995, yet labor costs per visit increased by nearly 5 percent. Again, this suggests poor labor efficiency in the outpatient arena. This also supports the argument that reengineering has done little to improve outpatient labor efficiency. The most visible result of the initiative was combining family practice, internal medicine, and pediatrics

TABLE B-3

Inpatient and Outpatient Labor Costs Per Unit of Output

INPATIENT LABOR COSTS:	FY 93	FY 94	FY 95
Inpatient Labor-Military	\$ 1,869,351	\$ 1,784,892	\$ 1,547,693
Inpatient Labor-Civilian	\$ 618,353	\$ 706,913	\$ 782,754
Inpatient Labor-Total	\$ 2,487,704	\$ 2,491,805	\$ 2,330,447
Pay Raise	n/a	2.60%	2.60%
ADJ. LABOR COST	\$ 2,487,704	\$ 2,428,660	2,105,755
Weighted Discharges	3,629	3,091	3,015
COST/WGHT. DISCHARGE	\$ 685.44	\$ 785.68	\$ 698.53
% Change in Cost/Wght. Discharge from FY 93	n/a	14.62%	1.91%
% Change in Cost/Wght. Discharge from FY 94	n/a	n/a	-11.09%
% Change in Wght. Discharges from FY 93	n/a	-14.83%	-16.94%
% Change in Wght. Discharges from FY 94	n/a	n/a	-2.48%

OUTPATIENT LABOR COSTS:	FY 93	FY 94	FY 95
Outpatient Labor-Military	\$ 4,528,300	\$ 4,712,357	\$ 4,545,771
Outpatient Labor-Civilian	\$ 1,865,767	\$ 1,661,940	\$ 2,105,299
Outpatient Labor-Total	\$ 6,394,067	\$ 6,374,297	\$ 6,651,070
Pay Raise	n/a	2.60%	2.60%
ADJ. LABOR COST	\$ 6,394,067	\$ 6,212,765	\$ 6,009,800
Keller Outpatient Visits	168,502	149,244	151,030
COST/VISIT	\$ 37.95	\$ 41.63	\$ 39.79
% Change in Cost/Visit from FY 93	n/a	9.70%	4.86%
% Change in Cost/Visit from FY 94	n/a	n/a	-4.41%
% Change in Visits from FY 93	n/a	-11.43%	-10.37%
% Change in Visits from FY 94	n/a	n/a	1.20%

into one department to maximize support resources. The results of this cost analysis suggest this has not occurred.

The results indicate Keller possesses excess capacity. Since, over the short-term, labor costs behave like fixed costs, the increase in cost per unit may be attributed to steep declines in weighted discharges and outpatient visits. The labor costs per unit may be higher because these

fixed costs are spread over a small number of outputs. Over the long-term, Keller must increase market share or reduce its workforce.

One potential problem exists with the labor costs per unit analysis. The inpatient and outpatient costs are drawn from Keller's MEPRS cost report. They include wage and benefit expenses, but are allocated to inpatient or outpatient activities based on self-reported time percentages. Inaccurate or inattentive reporting by the staff will influence the results and limit one's ability to draw generalizable conclusions. Keller's time reporting is probably more accurate than the average MHSS facility. Time reports are reconciled with workload reports monthly. Yet potential explanations for the costs per unit discussed above can include the fact that time reporting has improved or worsened during the study period.

APPENDIX C - ACCESS ANALYSIS

Access has long been a top complaint among users of the MHSS. Military commanders and their staffs have struggled to reconcile what one author called the “....the short-term demands and needs of existing patients....” and medical readiness requirements (Brennan 1992). The major emphasis behind the Tricare program is to improve readiness and access by increasing the number of providers available to treat military beneficiaries.

Survival in a managed care environment requires commanders to proactively meet the demands of patients instead of reacting to their complaints. This will directly translate into Tricare Prime enrollment - increased market share for the MHSS facility. Currently, access can be viewed in one of two ways. The first method is to measure demand satisfaction - how many patients were treated in an acceptable period of time. Historically, we have used indicators like appointment waiting times to measure demand satisfaction. An alternative method for viewing access is to consider alternative sources of care. If a military facility considers CHAMPUS as an alternative care source, then CHAMPUS use means patients are going to a competitor. The portion of all visits (CHAMPUS and MTF) that the organization can capture is the MTF's access measure. Table C-1 shows Keller's access as a percentage of all inpatient discharges and outpatient visits in its catchment area. Table C-1 also considers trends in inpatient CHAMPUS nonavailability statements issued.

Inpatient CHAMPUS utilization, measured by the number of nonavailability statements issued decreased by 32 percent between fiscal years 1993 and 1994. This is attributed to intensive management by the Deputy Commander for Clinical Services (DCCS) and Chief,

TABLE C-1

Inpatient and Outpatient Access

<i>INPATIENT ACCESS</i>	FY 93	FY 94	FY 95
NAS Issued	405	276	344
Percent Change in NAS's from FY 93	n/a	-31.85%	-15.06%
Percent Change in NAS's from FY 94	n/a	n/a	24.64%
CHAMPUS Discharges (Unweighted)	894	600	801
Keller Discharges (Unweighted)	3,791	3,292	3,191
Total Discharges (Unweighted)	4,685	3,892	3,992
Percent of Total Discharges that are CHAMPUS	19.08%	15.42%	20.07%
Percent Change from FY 93	n/a	-16.93%	-14.79%
Percent Change from FY 94	n/a	n/a	2.57%
 <i>OUTPATIENT ACCESS</i>	 FY 93	 FY 94	 FY 95
CHAMPUS Outpatient Visits	20,128	21,581	33,372
Keller Outpatient Visits	168,502	149,244	151,030
Total Outpatient Visits	188,630	170,825	184,402
% of Total Visits that are CHAMPUS	10.67%	12.63%	18.10%
% Change from FY 93	n/a	18.39%	69.60%
% Change from FY 94	n/a	n/a	43.25%

Managed Care, who was a certified clinical case manager. CHAMPUS discharges accounted for approximately 15 percent of total discharges in Keller's catchment area in fiscal year 1994. This translates into a 17 percent increase in inpatient access between fiscal years 1993 and 1994.

Fiscal year 1995 CHAMPUS discharges accounted for 20 percent of all catchment area discharges, a 15 percent improvement in inpatient access during the study period, but a 3 percent decline from 1994.

The analysis of outpatient CHAMPUS use reveals a similar trend. In fiscal year 1993, CHAMPUS accounted for 11 percent of all catchment area outpatient visits. By fiscal year 1995 that number increased to 18 percent, a 70 percent decrease in outpatient access.

If one wants to consider these results in terms of market share, Keller controlled 81 percent of the inpatient market and 89 percent of the outpatient market in fiscal year 1993. By fiscal year 1995, Keller's market share declined to 80 percent and 82 percent, respectively. The outpatient decline is particularly disturbing. CHAMPUS outpatient use increased by two-thirds from fiscal year 1993 to 1995 while Keller's decreased by 10 percent. During that period, Keller's staff has remained stable in spite of personnel support for military operations in Haiti and Somalia. This suggests the reengineering initiative has adversely affected patient access and satisfaction to such a degree that patients are using CHAMPUS outpatient care as their sole means of health care services.

One additional access measure is available. Military emergency rooms are frequently overcrowded. Many of the patients seen are in the emergency room for convenience because primary care appointments are unavailable or operating hours do not meet the needs of the patient. Keller's problem in this area is not unique, but the magnitude of the problem is striking. Only 1 percent of all Keller's emergency room visits are considered emergent or urgent care cases by Keller's medical staff. More than 11,000 inappropriate emergency room visits were recorded in fiscal year 1995. Table C-2 shows the analysis of this metric.

Of all Keller outpatient visits reported in fiscal year 1993, more than 6 percent occurred in the emergency room. By fiscal year 1995, that figure increased by 20 percent to nearly 8 percent of all Keller outpatient visits. The reader should note this represents a decrease from 1994 levels, but the overall trend is still increasing. This supports the results of the CHAMPUS

TABLE C-2

Emergency Room Utilization

<i>EMERGENCY ROOM USE</i>	FY 93	FY 94	FY 95
Total ER Visits	10,966	12,265	11,807
Urgent/Emergent Cases	151	168	161
Inappropriate ER Visits	10,815	12,097	11,646
% Inappropriate Visits	98.62%	98.63%	98.64%
Keller Outpatient Visits	168,502	149,244	151,030
% Of Keller Visits that are Inappropriate ER Visits	6.42%	8.11%	7.71%
% Change from FY 93	n/a	26.29%	20.14%
% Change from FY 94	n/a	n/a	-4.87%

utilization analysis. During the last three fiscal years, it has become increasingly difficult to access outpatient care at Keller's outpatient clinics. More patients are turning to expensive alternatives such as CHAMPUS and emergency room care for outpatient care. One can assume that these same patients will be less inclined to enroll in Tricare Prime at Keller and will prefer to use the contractor's primary care network for their health care needs. This will have an adverse impact on Keller's budget's under the Tricare program.

WORKS CITED

- Bachman, K. 1996. The reengineering of a military treatment facility (MTF). Unpublished manuscript. February 1996.
- Bergman, R. 1994. Reengineering health care: A new management tool aims to transform the organizational processes - and stir discussion. Hospitals & Health Networks, 5 February, 28.
- Brennan, M. J. 1992. Military medicine for the twenty-first century: "To shape the future". Carlisle Barracks, PA: U.S. Army War College.
- Boston, C. and K.W. Vestal. 1994. Work transformation: Why the new health care imperative must focus both on people and processes. Hospital & Health Networks, 5 April, 50.
- Donatelli, N.S. 1994. Cost containment through reengineering: One example from an outpatient department. Journal of Emergency Nursing 20:6 (December): 464-67.
- Eastaugh, S.R. 1992. Hospital Strategy and Financial performance. Health Care Management Review 17:3 (Summer): 19-31.
- Ebert, T. 1996. Telephonic conversation between CPT Heimall and CMDR Ebert, Office of the Assistant Secretary of Defense for Health Affairs, Washington D.C. 22 February 1996.
- Ernst, D.F. 1994. Total quality management in the hospital setting. Journal of Nursing Care Quality 8(2): 1-8.
- Griffith, J.R. 1994. Reengineering health care: Management Systems for Survivors. Hospitals & Health Services Administration 39:4 (Winter): 451-70.
- Holloway, J.J. and J.W. Thomas. 1989. Factors influencing readmission risk: Implications for quality monitoring. Health Care Financing Review 11:2 (Winter): 19-32.
- Martin, E. 1996. Presentation to 1996 Tricare Conference. Washington D.C. 23 January 1996.

- Keller Army Community Hospital. 1996. Presentation to potential Tricare Contractors. West Point, NY. 4 March 1996.
- Lewis, A.V., J. White, and B. Davis. 1994. Appointment access: Planning to benchmark a complex issue. Journal of Quality Improvement 20(5): 285-293.
- Linden, L. and K. English. 1994. Adjusting the cost-quality equation: Utilizing work sampling and time study data to redesign clinical practice. Journal of Nursing Care Quality 8(3): 34-42.
- Lumsdon, K. 1995. Mean streets: Five lessons from the front lines of reengineering. Hospital & Health Networks 69:19 (5 October 1995): 44-52.
- MacStravic, R. and N. Field. 1980. Why occupancy isn't the best measure of hospital performance. Trustee August: 33-36.
- Moffitt, G.K., P.B. Daly, L. Tracey, M. Galloway, T.C. Tinstman. 1993. Patient-focused care: Key principles to restructuring. Hospital & Health Services Administration 38:4 (Winter): 509-521.
- Northern Metropolitan Hospital Association. 1996. Telephonic conversation between CPT Heimall and Ms. Cindy Neal, Northern Metropolitan Hospital Association, Newburgh, New York. 16 February 1996.
- Strasen, L. 1994. Reengineering hospitals using the "Function follows form" model. Journal of Nursing Administration 4:12 (December): 59-63.
- Schwartz, M.J., and Fritz, L.R. 1996. Expense reduction: Rapid redesign on a short timeline. Presentation at the 1996 Congress on Healthcare Management, Chicago, IL, 12 March 1996.
- Torma, M.J., B. Galing, R. Palmer, S. West, D. Brown, D. Kentsmith, P. Chappell, M. Quaife, and D. Schutt. 1993. An integrated model for measuring management performance. Physician Executive 19:5 (September-October): 31-37.
- U.S. Army Medical Command Patient Administration and Biostatistics Activity. 1995. Telephonic and E-mail correspondence between CPT Heimall, Mr. Scott Morrison, and Ms. Emma Jane Frazier. Fort Sam Houston, TX, November-December 1995.
- U.S. Bureau of Labor Statistics. 1995. Internet Home Page. URL: <http://stats.bls.gov:80/cgi-bin/dsrv?cu>. Washington D.C. 1995.

U.S. Department of Defense, Tricare Lead Agent Region 1. 1995. Tricare Managed Care Program Information Paper. [Washington, D.C.] U.S. Department of Defense, Tricare Lead Agent Region 1.

U.S. Government Accounting Office. 1995. Defense health care: Issues confronting military medicine. GAO/HEHS-95-104. [Washington, D.C.] U.S. Government Accounting Office.